WORKSHEET: EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Names and student IDs: _____

Recall the chain rule: If g is differentiable at x and f is differentiable at $g(x)$, and if $h(x) = f(g(x))$ for all x (in a suitable open interval), then

$$h'(x) = f'(g(x)) \cdot g'(x).$$

Also,

$$\frac{d}{dx}\big(e^x\big) = e^x \qquad \text{and} \qquad \frac{d}{dx}\big(\ln(x)\big) = \frac{1}{x}.$$

For each of the following functions, differentiate the function and simplify the derivative, or else tell me that no differentiation rule you have seen so far applies:

1. $f(x) = x\ln(x) - x$.

2. $g(x) = e^{x^2+7x}$.

3. $q(x) = \ln(x^2 + e^x)$.

4. $s(x) = e^{x^2 \sin(x)}$.

5. $p(x) = 7^x$.

6. $a(x) = x^{\sin(x)}$.

Date: 29 April 2025.